

Service Manual

VAP 20/30/40

1. General notes for users of the Service Manual VAP 20/30/40

This manual was written exclusive for the service staff of C. Gerhardt GmbH & Co. KG and for the service staffs of our international agencies.

This service manual shall help to get a deeper knowledge of how the instruments are constructed and how they work. It is an important tool to service and repair the instruments in a safe, competent and specific way. The transparent structure and the appendix of modification information will enable to order and to store the most useful spare parts. This manual will make servicing easier, in particular for our international agencies.

To provide yourself against risks during operation or service, the following safety instructions should be obeyed:



Make sure that no liquid gets into contact with cable connections or the interior of the electrical parts of the unit! Danger of electrical shock!



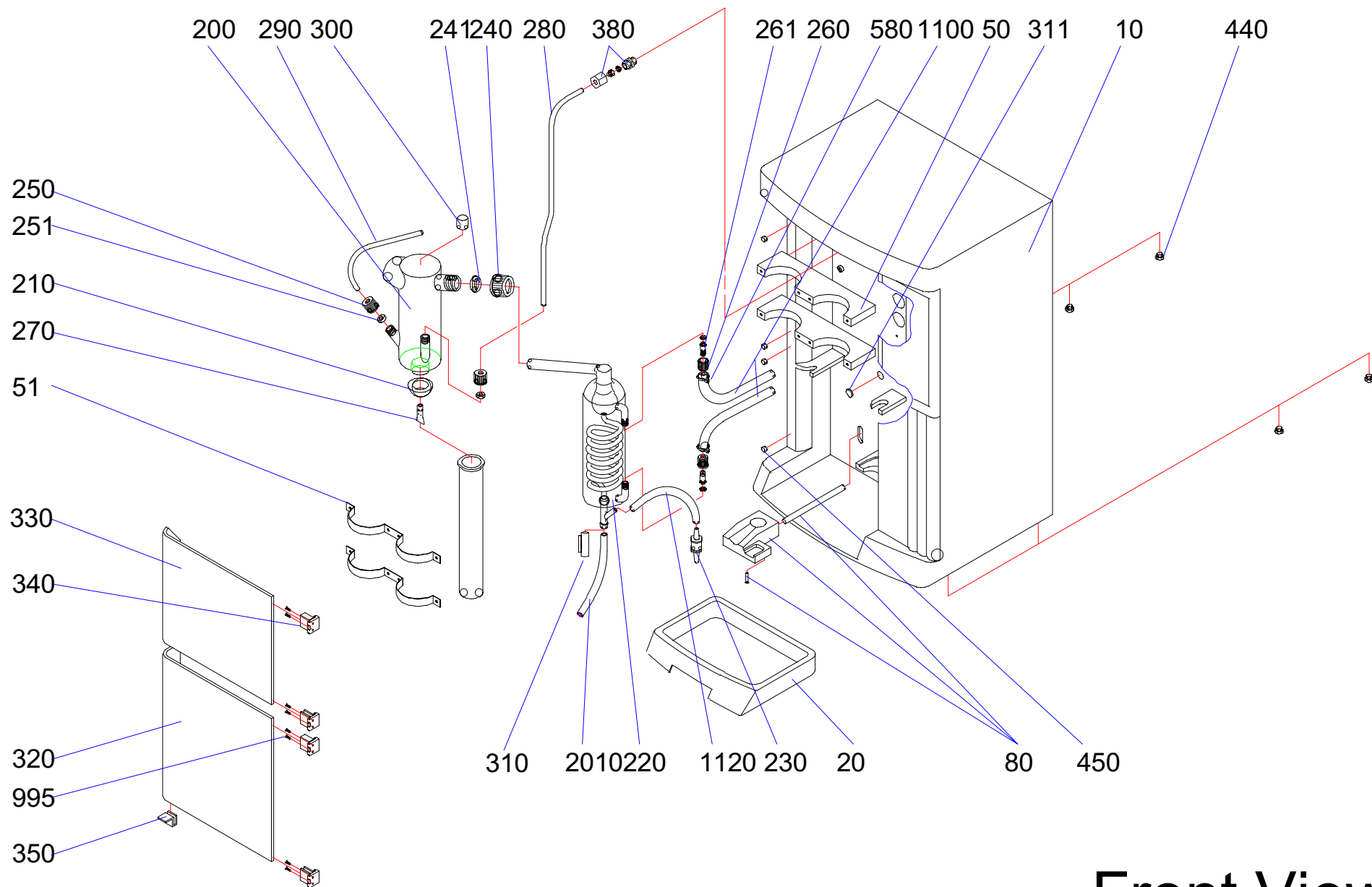
Repairs on electrical, electronic or mechanical parts must only be done by authorized personnel.



Always switch off the apparatus at the mains and pull the plug before opening! Danger of electrical shock!



The apparatus must be used according to the instruction manual. It is not allowed to make changes to the apparatus in order to modify its application.

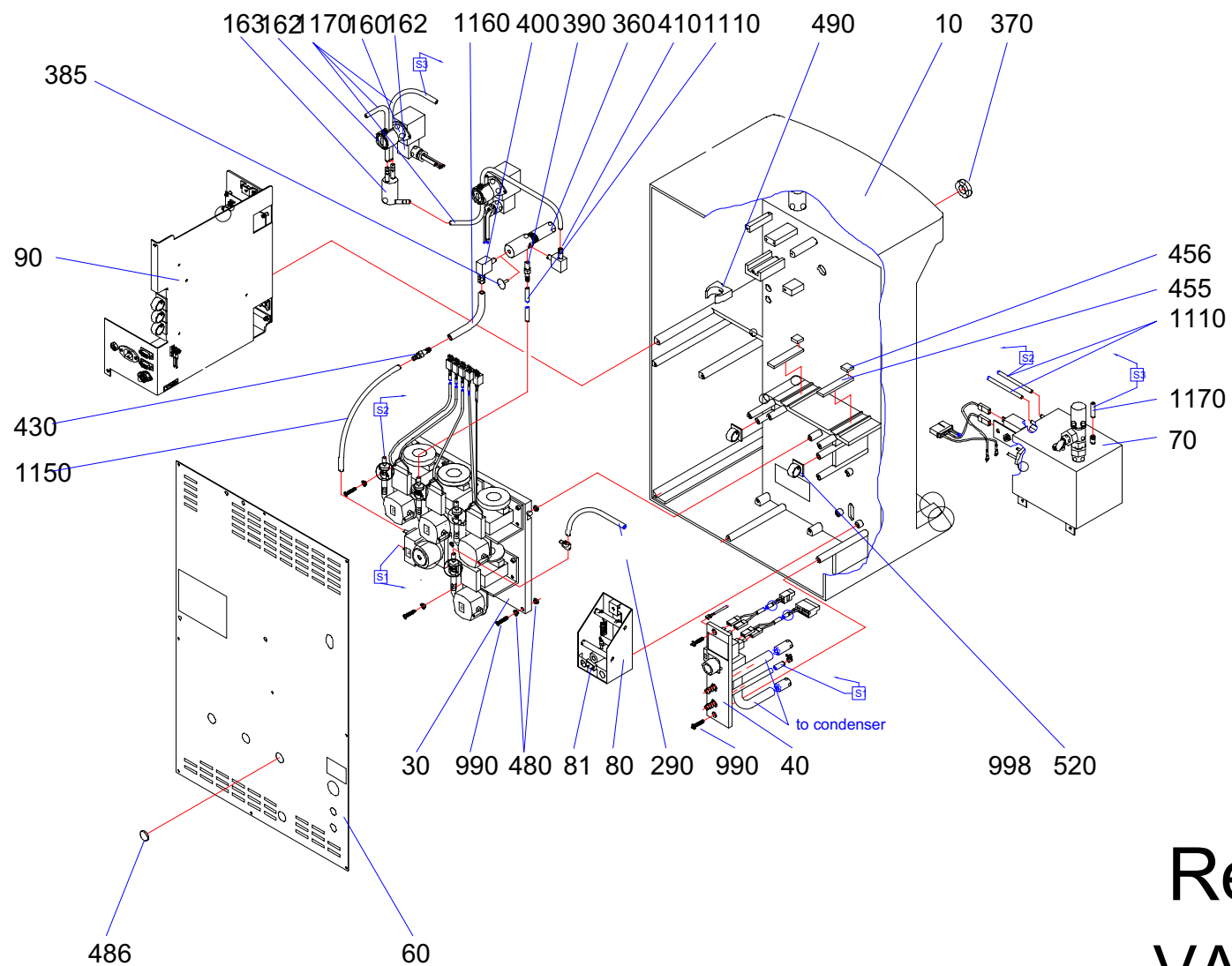


Front View
VAP 20/30/40

Date:

Key to Front view VAP 20/30/40

Drawing-No.	Part-No.	Description	Modif. 1	Modif. 2	Modif. 3	Modif. 4
10	50014	Case, C.G. yellow				
20	50015	Drip tray PP, VAP 20 - 40				
50	50018	Holder VK/DK VAP 20 - 40				
51	50020	Clamp fitting for 50018				
80	50003	Quick clamping device for sample tube, compl.				
	50012	Wedge, PP				
	13308	Switch for clamping device				
200	7472	Distribution head, glass				
210	6470	Viton cone				
220	7673	Distillation condenser				
230	6474	Ventilation valve, PP, for distillation condenser				
240	16604	Screw cap GL 32, open				
241	16607	Silicone seal GL 32				
250	16602	Screw cap GL 18				
251	16606	Silicone seal GL 18				
260	16601	Screw cap GL 14				
261	16609	Silicone seal GL 14, with tubing connection				
270	30698	PTFE - sieve for steam inlet tube				
280	11810	PTFE - inlet tubing, steam				
290	11811	PTFE - inlet tubing, NaOH				
300	50021	Distance piece for distribution head				
310	40234	Tubing holder for H3BO3				
311	25102	Dummy plug for 8mm hole				
320	19015	Plexiglass protection door, bottom	02.05.96			
330	19016	Plexiglass protection door, top	02.05.96			
340	18250	Door hinges	02.05.96			
350	18251	Door handle				
380	17542	PP-tube joint				
440	17940	Rubber foot, 5mm				
450	17945	Rubber foot GF 21, self-adhesive				
580	18404	Cable binder				
1100	22705	Silicone tubing 8/16				
1120	20903	Silicone tubing 6/10	16.03.95			
2010	22704	Silicone tubing 8/12				

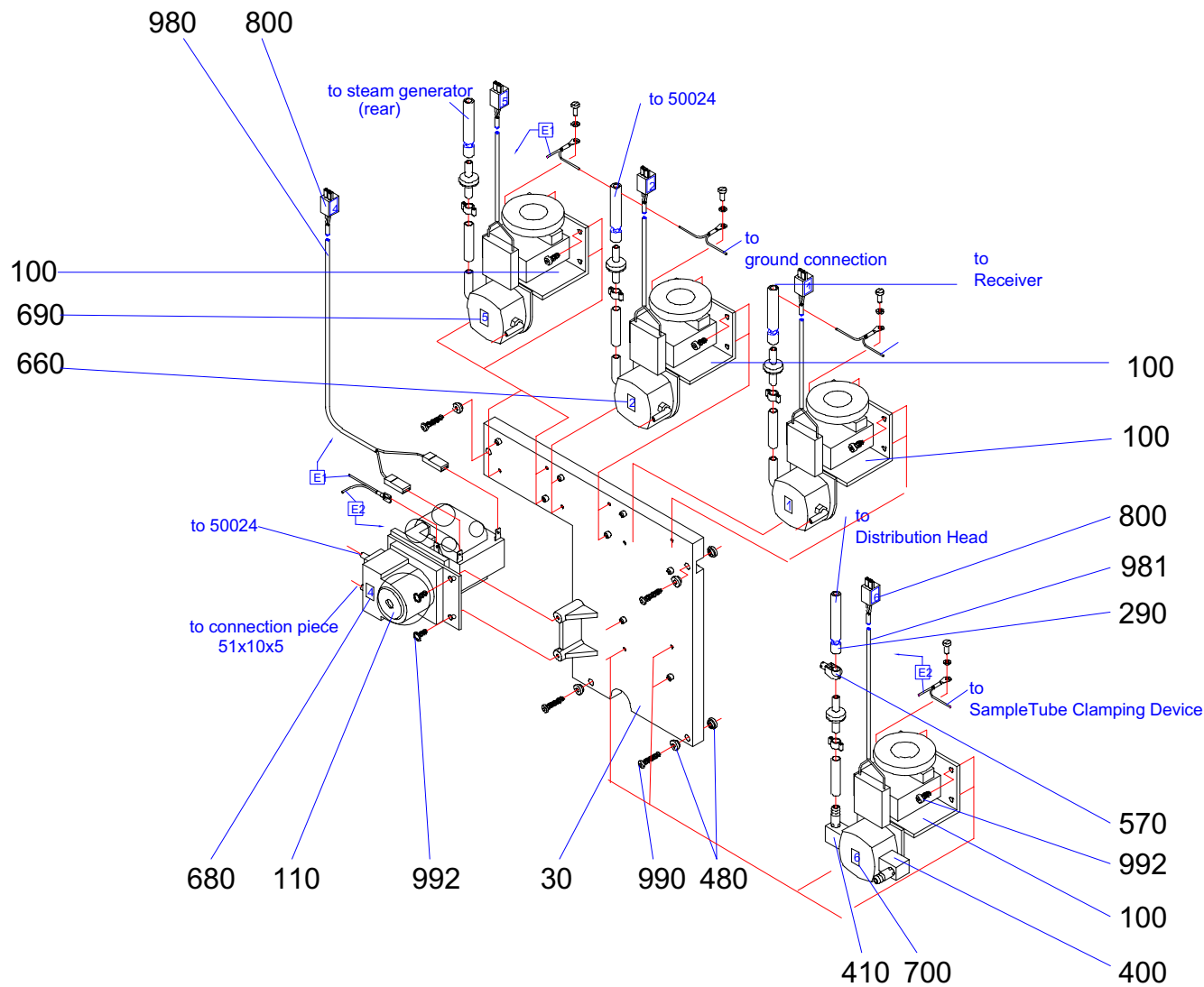


Rear View
VAP 20/30/40

Date:

Key to Rear View VAP 20/30/40

Drawing-No.	Part-No.	Description	Modif. 1	Modif. 2	Modif. 3	Modif. 4
10	50014	Case, C.G. yellow				
30	50016	Pump-holding module VAP 20 - 40 (see 4.1)				
40	50017	Tubing-connection module VAP 20 - 40 (see 4.2)				
60	50019	Rear cover VAP 20 - 40, C.G. yellow				
70	40850	Steam Generator DE 94 (see 4.5)	11.08.95	27.09.95		
80	50003	Quick clamping device for sample tube, compl.				
81	13308	Switch (Tube present)				
90	40890	PCB-module 230 V, VAP 20, compl. (see 4.3)				
	40891	PCB-module 230 V, VAP 30, compl. (see 4.3)				
	40892	PCB-module 230 V, VAP 40, compl. (see 4.4)				
160	10385	Pinch-solenoid valve S 307	20.06.95			
161	10389	Tube holding device for valve 10385				
162	11003	Plug with bridge rectifier for valve 10385				
163	40269	Ventilation vessel, glass	20.06.95			
290	11811	PTFE inlet tube, NaOH				
360	50024	PP - connector				
370	40249	Screw connection, (part 3) for 50024				
385	40239	PP - dummy plug for 50024				
400	10318	PP - connection, bent, DN 08 R 1/8"				
410	10317	PP - connection, bent, DN R 1/8"				
430	50023	Tubing connection, PP, 51x10x5				
455	27309	Silicone - red 15x80x5 (base for Steam Generator)				
456	27310	Silicone - red 15x15x3 (base for Steam Generator)				
480	18411	Guiding spout				
486	25121	Cap Heyco, d = 22,5mm				
490	17914	Band clamp fitting OBO - Quick PG 21				
520	17920	Clamp 12H8074				
600	23230	Set screw VA M4x30 DIN 551				
610	23002	Label for ground connection, M4, 9x18, Al				
1110	20914	Silicone-tubing 4x7, from pump H2O to 50024				
1150	20920	Verprene-tubing 4x8	30.03.95			
1160	20921	Verprene-tubing 8x12				
1170	20919	Neoprene-tubing 4,8x1,6 approx. 170mm and 520mm				

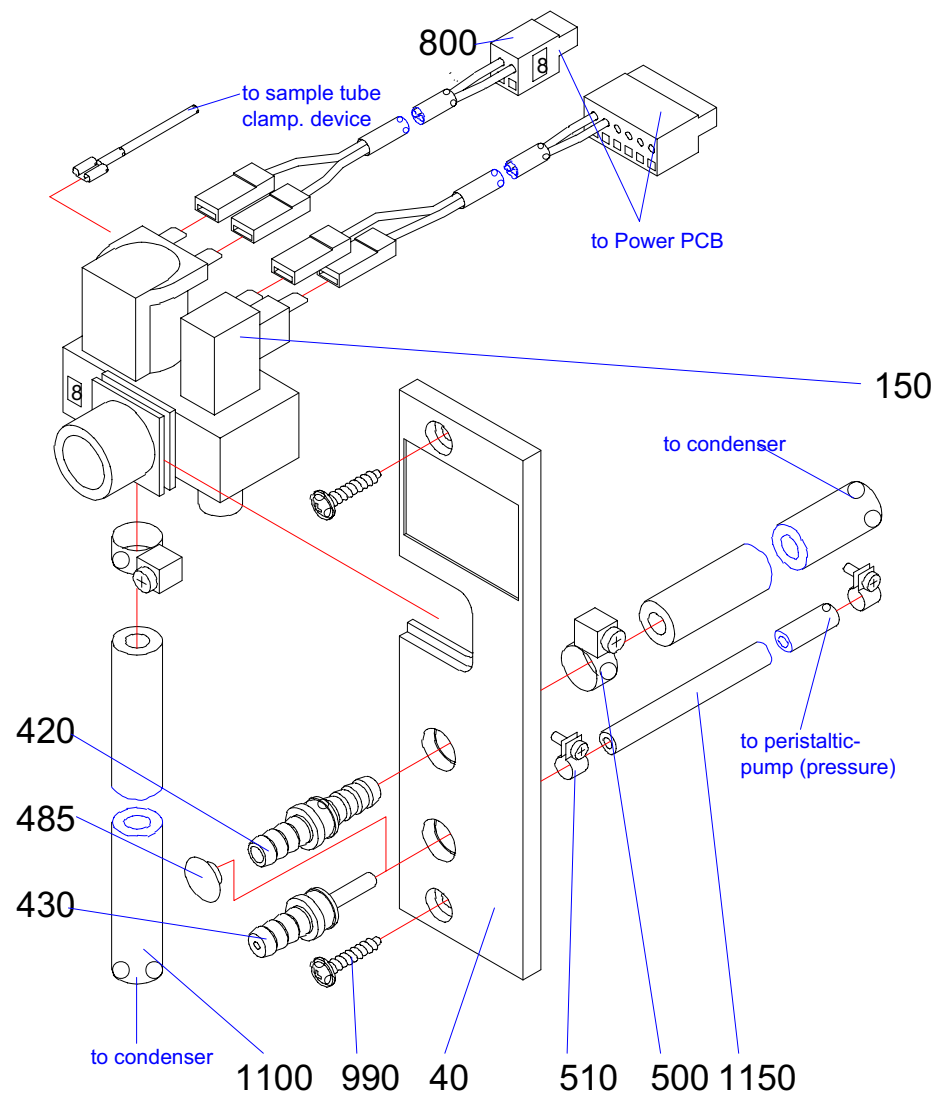


Pump Holding Module VAP 20/30/40

Date:

Key to pump-holding module VAP 20/30/40

Drawing-No.	Part-No.	Description	Modif. 1	Modif. 2	Modif. 3	Modif. 4
30	50016	Pump-holding module VAP 20 - 40				
100	10310	Diaphragm-pump PML 1140-ND100 (see 6.0)	30.03.95	15.12.95		
110	10360	Peristaltic-pump SR25 230 V				
290	11811	PTFE - inlet tubing NaOH				
400	10318	PP - connection, bent, DN 08 R 1/8"				
410	10317	PP - connection, bent, DN 06 R 1/8"				
480	18411	Guiding spout				
570	22701	Clamp VZ N10				
660	18421	SES Markers S-9-J/2				
680	18423	SES Markers S-9-J/4				
690	17424	SES Markers S-9-J/5				
700	18425	SES Markers S-9-J/6				
800	11140	Multiple contact strip				
980	20050	Insulation tube sw 6x0,5				
981	20072	Insulation tube sw 5x0,5				

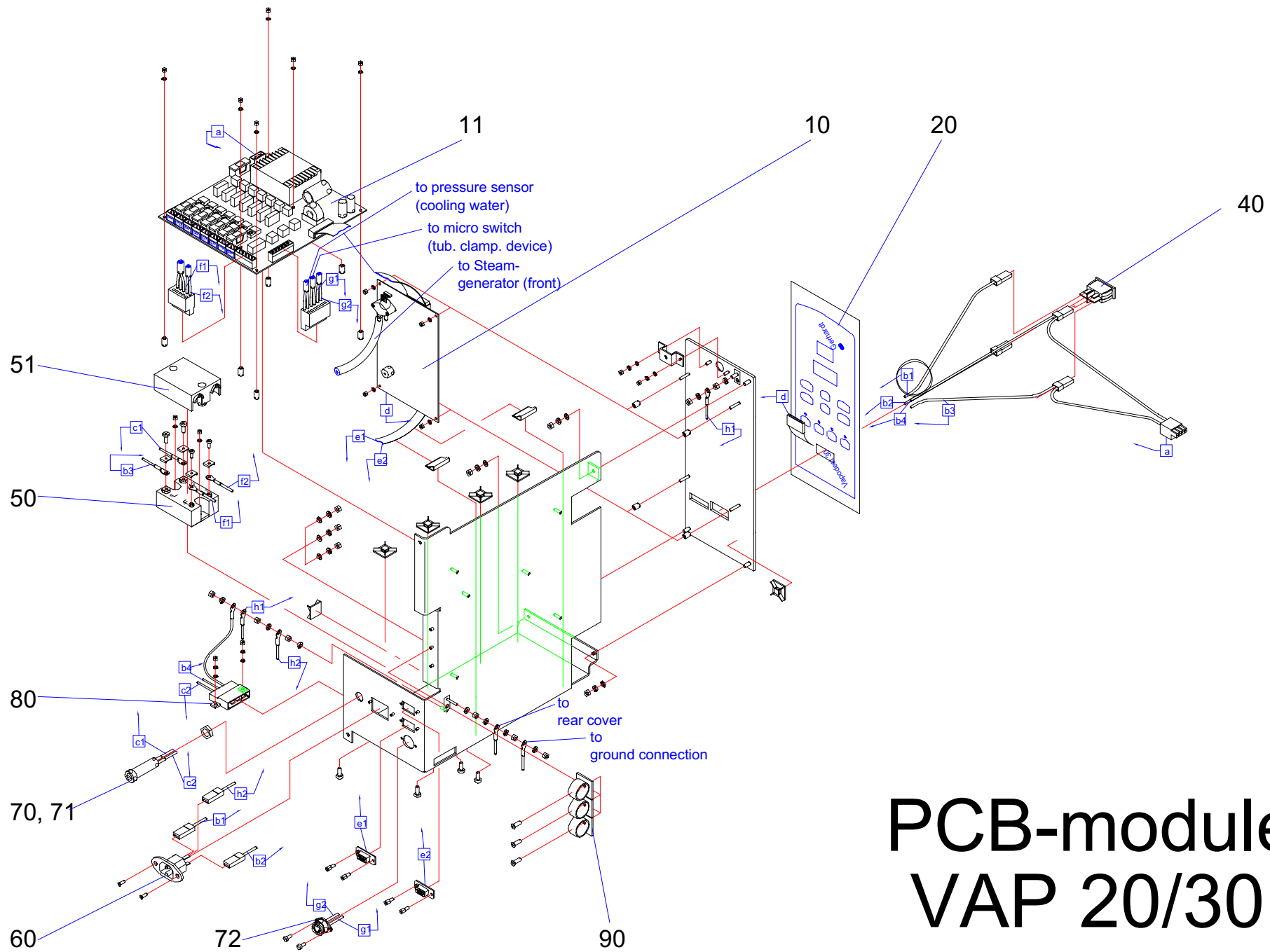


**Tubing Connection Module
VAP 20/30/40**

Date:

Key to tubing connection module VAP 20/30/40

Drawing-No.	Part-No.	Description	Remark	Modif. 1	Modif. 2	Modif. 3
40	50017	Tubing-connection module VAP 20 - 40				
150	17109	Magnetic valve with pressure control 0,5 bar, 5 l				
420	50022	Connection piece, PP, 51x10x10				
430	50023	Connection piece, PP, 51x10x5	(only VAP 30/40)			
485	25120	Cap, Heyco, d = 15,1mm	(only VAP 20)			
500	17908	Band clamp fitting				
510	17907	Band clamp fitting	(only VAP 30/40)			
800	11140	Multiple contact strip				
990	17960	VA - screw 1411 KA 50x25				
1100	22705	Silicone tubing 8x16				
1150	20920	Verprene tubing 4x8	(only VAP 30/40)			

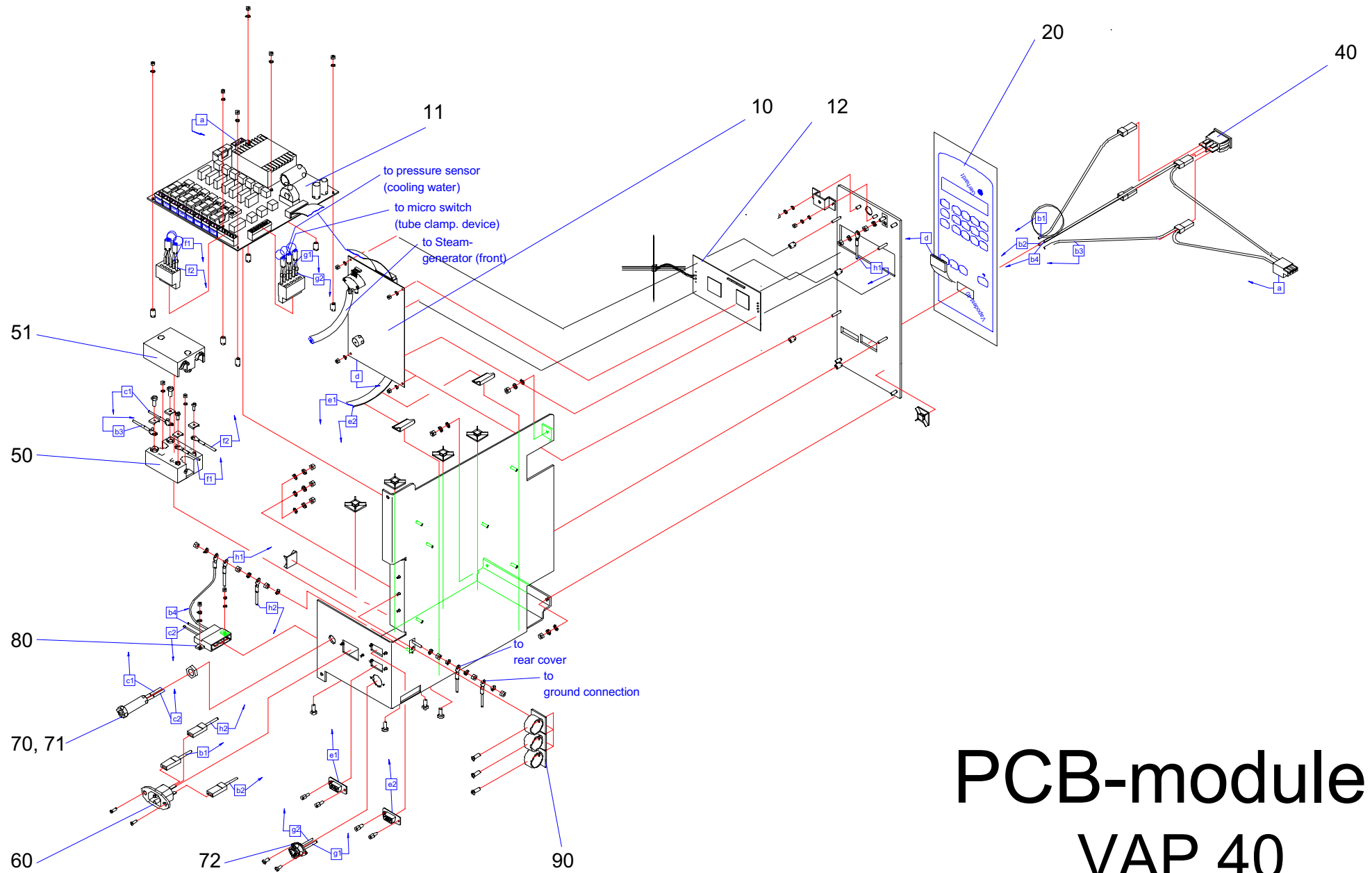


PCB-module VAP 20/30

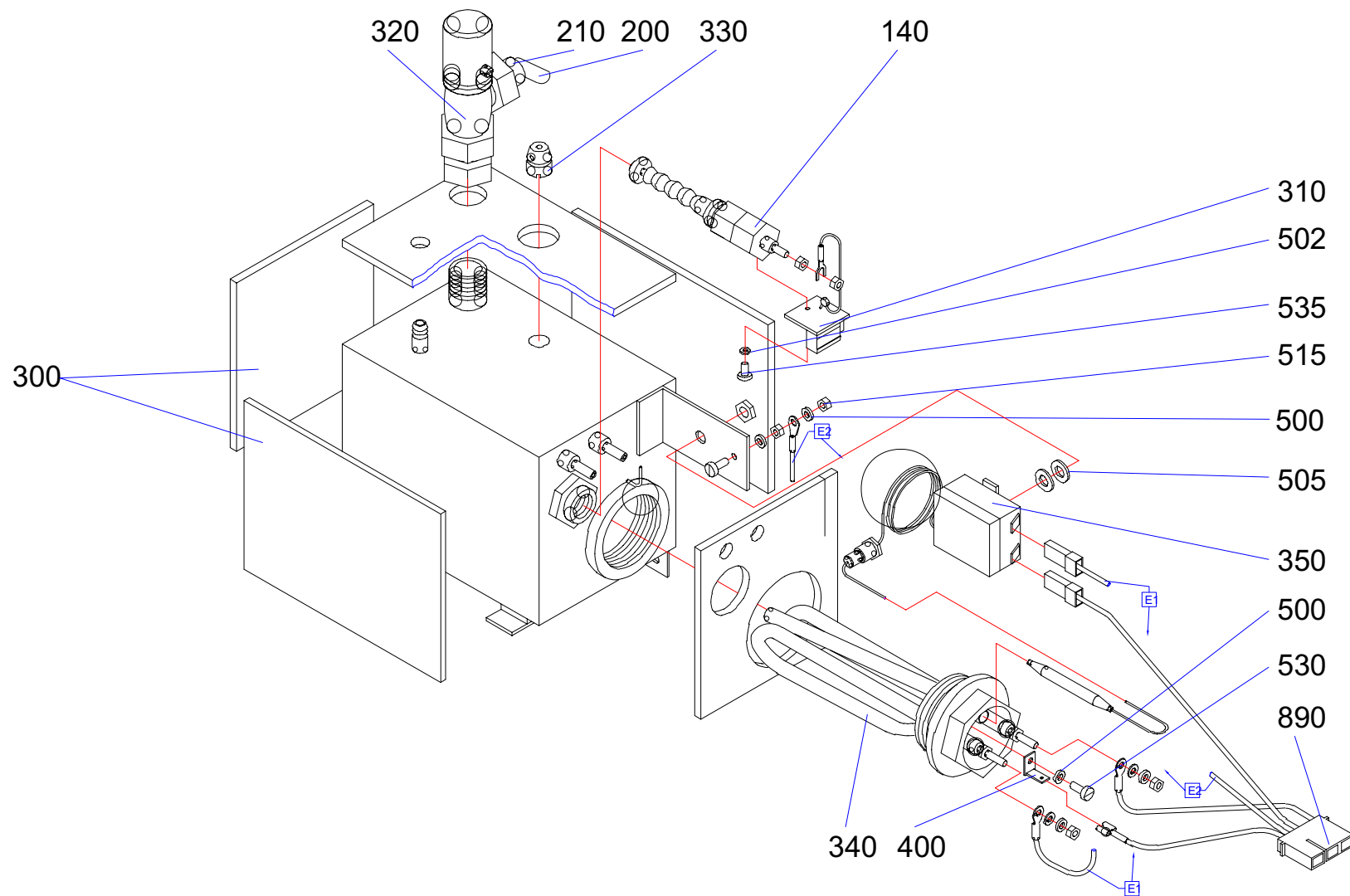
Date:

Key to PCB-module VAP 20/30/40

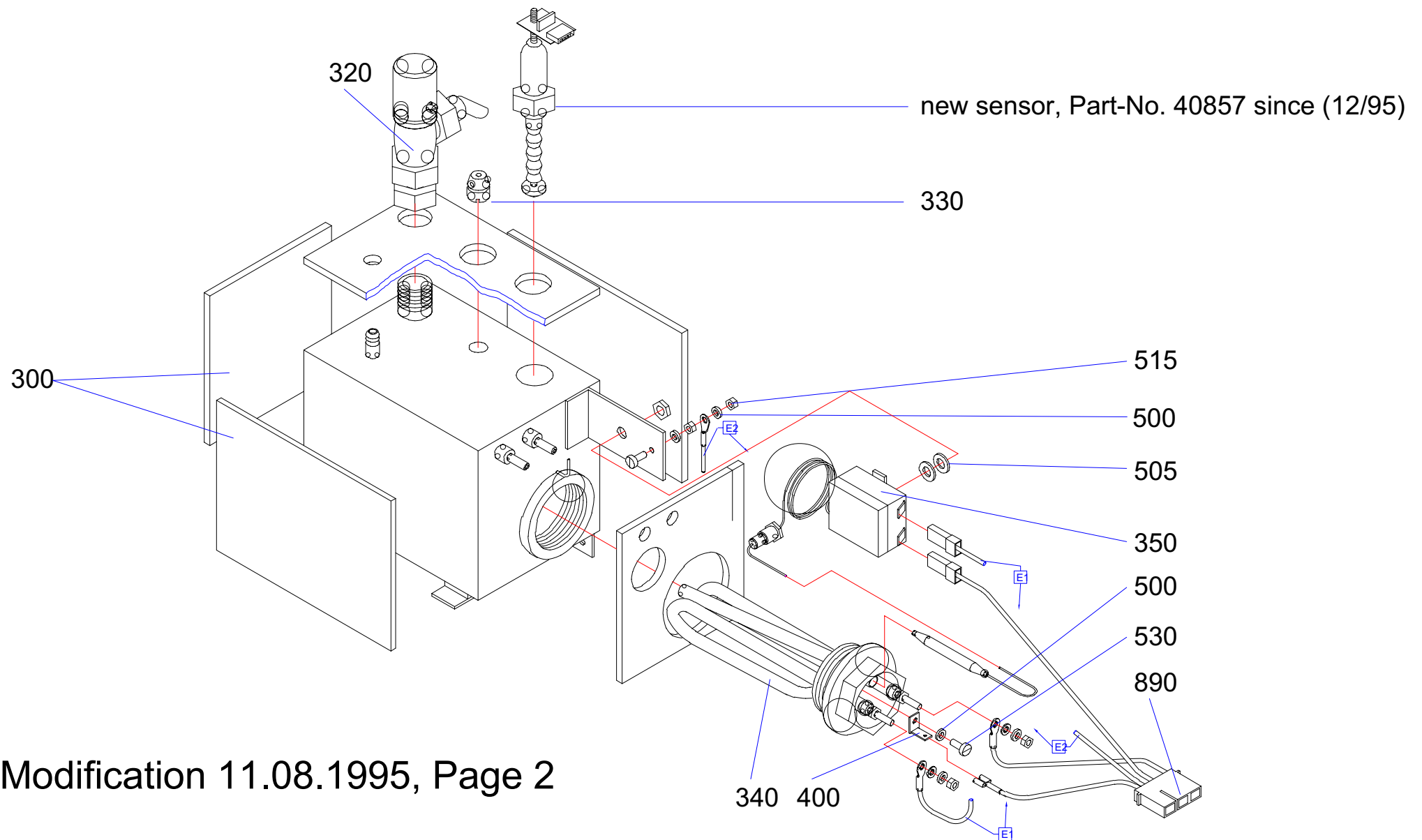
Drawing-No.	Part-No.	Description	Modif. 1	Modif. 2	Modif. 3	Modif. 4
10	11222	Control - PCB VAP 20/30				
	11225	Control - PCB VAP 40				
11	11223	Power - PCB 230 V, VAP 20/30/40				
12	11227	Display VAP 40				
20	11213	Keyboard VAP 20				
	11214	Keyboard VAP 30				
	11215	Keyboard VAP 40				
40	11750	Switch, green illuminated				
50	15350	Semiconductor relay WG-A5-6D25				
51	15351	Cap for 15350				
60	14401	Plug connection 161.5, for mains cable				
70	21417	Fuse holder, 16 A				
71	21420	Bayonet type cap for fuse 5x20 (for 21417)				
72	12703	Socket with byonet catch, 3 pin				
80	18690	Plug housing 021 032 660				
new	17916	Clamp fitting (for tube at pressure sensor)				



PCB-module VAP 40



Steam Generator VAP 20/30/30



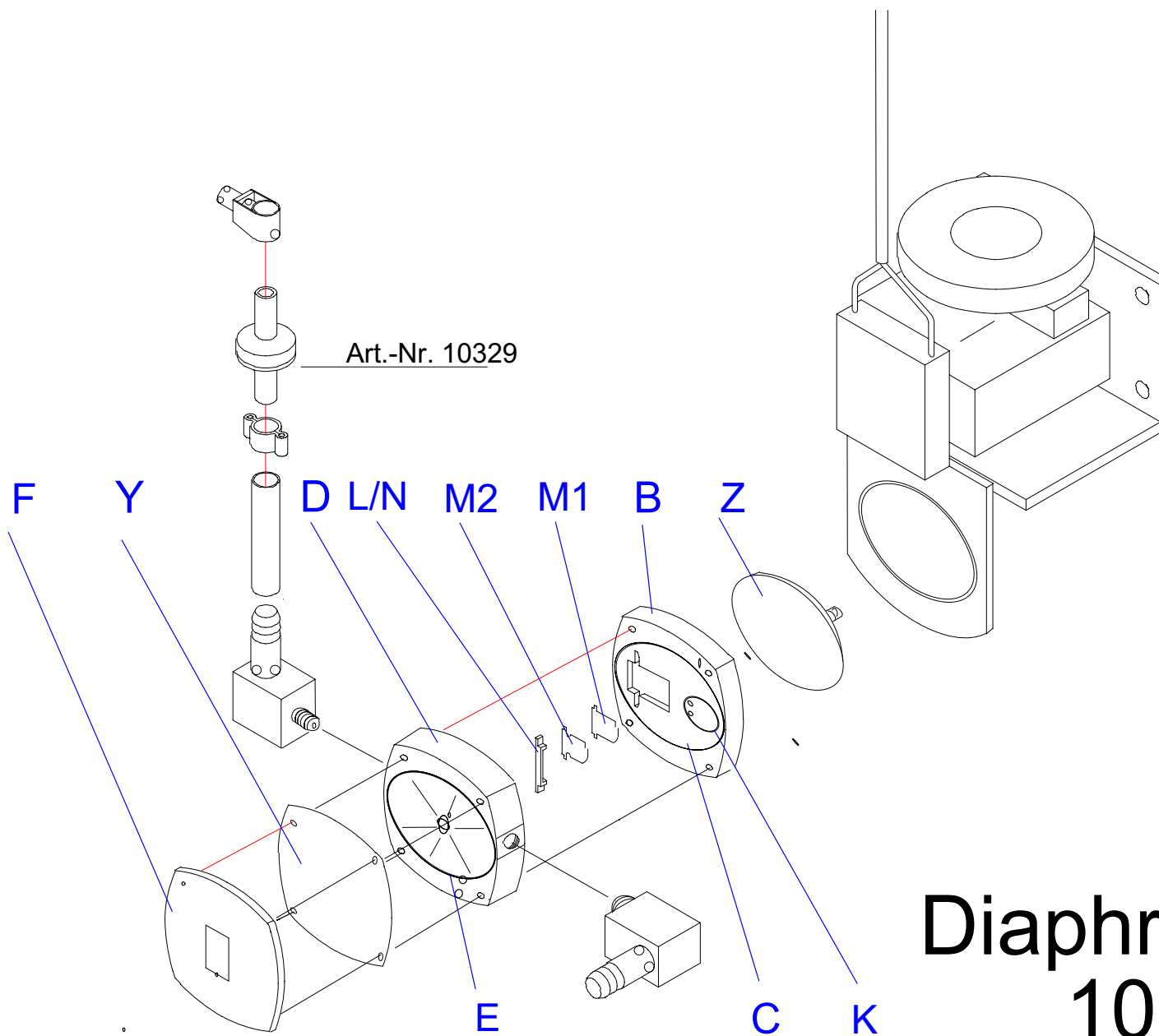
Modification 11.08.1995, Page 2

Together with the changement of the level sensor, also the steam generator has been changed.
Under the same Part-No. 40850 now only the new steam generator will be delievered.

Date:

Key to steam generator VAP 20/30/40

Drawing-No.	Part-No.	Description	Modif. 1	Modif. 2	Modif. 3	Modif. 4
140	40863	Level sensor	11.08.95			
300	21115	Multitherm 550 HD, 400x500x3mm				
320	20604	Excess-pressure valve, 604T				
330	20620	SKT - Ventilation valve				
340	12354	Tubular heating element, 230 V				
350	12307	Excess-temperature device				
400	18787	Plug-in connection piece + label for ground connection				
890	18691	Plug 020 030 660				



Diaphragm Pump
10310

Spare parts for diaphragm pump 10310

1) Pump-head comprising of the following parts:

Part-No.	Drawing-No.	Description	Quantity
10330	F	Cover of pump head	1
10325	D	Connection-piece for square connections	1
10322	B	Distance piece	1
10323	C,E	O-Ring	2
10326	K	O-Ring	1
10320	Y	Diaphragm	1
10327	M1	Valve plate (PTFE)	2
10328	M2	Valve plate (stainless steel)	2
10324	L,N	Clamp for valve tiles	2
17911	-	Angle-connection (inlet)	1
17910	-	Angle-connection (outlet)	1
10321	Z	Diaphragm with lip and screw	1

Attention !

In instruments Vap 20/30/40 there are different angle-connections for the pump NaOH.

Angle-connections Part-No. 17911 and 17910 are replaced against the following connections.

10317	-	PP - angle-connection (NaOH - outlet)	1
10318	-	PP - angle-connection (NaOH - inlet)	1
20918	-	Isoversinic-tubing see modification 2 from 30.03.1995	1

For pumps H₂O Part-No. 17911 and 17910 are valid.

**2) Other spare parts are not available. In case of damage customers only can order
the complete pump 10310 .**

Date:

Spare parts and accessories VAP 20/30/40

	Part-No.	Description	Modif. 1	Modif. 2	Modif. 3
	18560	PC - Label 67x72: Caution ! Before opening rear wall...			
	18561	PC - Label 32x50: Pump Suction (VAP 30/40)			
	18562	PC - Label 32x50: Pump H2O-sample (VAP 30/40)			
	18564	PC - Label 18x36: Cooling water outlet			
	18565	PC - Label 22x41: Pump NaOH			
	18566	PC - Label 18x79: Excess-temperature device			
	18567	PC - Label 18x78: Excess-pressure outlet			
	18568	PC - Label 32x50: Cooling water inlet with sieve			
	18569	PC - Label 32x50: Pump H2O-steam generator			
	26926	PC - Label 95x59: inside the instrument			
	26925	PC - Label 130x98: rear of PCB module			
	22802	Water inlet tubing 10/17, 2m			
	25450	PVC - pipe 6x1			
	25451	PVC - pipe 10x1			
	20921	Verprene-tubing 8/12 (for sample waste VAP 30/40)			
	22601	PVC - tubing 4/7, 2m (for pumps H2O dist.)			
	22604	PVC - tubing 8/12, 2m (for tank NaOH and cooling water outlet)			
	1311	Mains cable, 2m			
	7629	Set of tanks KAN20, with level switch			
	7639	Set of tanks KAN30, with level switch			
	7649	Set of tanks KAN40, with level switch			
	6471	Viton cone VK micro, for 100ml tubes KMT			
	4260	RS 232/485 ARS			
	4261	Data cable DK 42 for RS 485, 2m			
	4262	Data cable DK 45 for RS 485, 5m			
	4264	Data cable DK 22 for RS 232, 2m			
	4265	Terminator AST			

Date:

Modification kit Devarda for VAP 20/30/40

	Part-No.	Description	Modif. 1	Modif. 2	Modif. 3
	7474	PP - distribution head Devarda, VPD 7, bottom (instead of 7472)			
	7475	Distribution head Devarda, glass, VGD 7, top (instead of 7472)			
	30244	Ventilation valve for condenser, glass			
	7676	Condenser, shortened (instead of 7673)			
	40213	PP - adaptor			
	50025	PP - distance piece for distribution head (instead of 50021)			
	16604	Screw cap GL 32, open			
	16607	Silicone - seal GL 32			

Date:

Modification kit Bi-dist for VAP 20/30/40

	Part-No.	Description	Modif. 1	Modif. 2	Modif. 3
	50027	Holder for customer's Bi-Dist installation			
	50026	Rear cover C.G. (instead of 50019)			
	17103	Magnetic valve without pressure control			
	17110	Flow control for cooling water, MR 05			
	40231	Sample outlet, PP transparent			
	17908	Clamp VZ 12-22/9			
	17907	Clamp VZ 8/7 (VAP 30/40)			
	25121	Cap Heyco, d = 22,5mm			
	25122	Cap, Heyco, d = 34,8mm (VAP 20)			
	11140	Multiple contact strip			
	18424	SES - Markers S-9-J/5			
	18560	PC - Label 67x72: Caution! Before opening rear cover...			
	18564	PC - Label 18x36: Water outlet			
	18565	PC - Label 22x41: Pump NaOH			
	18566	PC - Label 18x79: Excess-temperature device			
	18567	PC - Label 18x78: Excess-pressure outlet			
	18568	PC - Label 32x50: Cooling water inlet with sieve			
	18569	PC - Label 32x50: Pump H2O-steam generator			
	18561	PC - Label 32x50: Pump suction (VAP 30/40)			
	18562	PC - Label 32x50: Pump H2O-sample (VAP 30/40)			

Date:

Other parts and accessories for VAP 20/30/40

		Modification to PP- distribution head				
	Part-No.	Description	Quantity	Modif. 1	Modif. 2	Modif. 3
	7482	PP - distribution head VAP 20 (instead of 7472)	1			
	7676	Distillation condenser VAP 20 (instead of 7673)	1			
		Modification to Büchi				
	Part-No.	Description	Quantity	Modif. 1	Modif. 2	Modif. 3
	7483	Distribution head, glass (instead of 7472)	1			
		Modification to micro				
	Part-No.	Description	Quantity	Modif. 1	Modif. 2	Modif. 3
	6471	Viton cone micro	1			
		Modification to acid-resistant				
	Part-No.	Description	Quantity	Modif. 1	Modif. 2	Modif. 3
	30244	Ventilation valve, glass (instead of non-return valve 10329)	1			
	20918	Isoversinic-tubing 6x12 (instead of PVC-tubing at pump NaOH)	45mm	30.03.95		
	27101	Clamp VA 6-16 (to fasten 20918)		30.03.95		
	10327	Valve plate PTFE for pump NaOH	2	15.12.95		

8.0 Steam Generator

8.1 General description of steam generation

After switching-on the Vapodest the electronics measures the level of water inside the steam generator via the level sensor. In case of a level below minimum, the pump for H₂O steam generator is switched on until the level sensor detects sufficient water inside the steam generator. This will take some seconds.

Then the semiconductor relay switches on the tubular heating element with maximum power to reach the necessary steam pressure for the distillation. When this pressure is reached, the maximum heating power is switched off and the instrument reverts to stand-by with a regulated and controlled heating. The instrument now is ready for distillation.

When starting a distillation the instrument will heat with a selected power from 30% - 100% (VAP 20/30) or 40% - 100% (VAP 40). The steam will reach the sample tube via pinch-solenoid valve(s), ventilation glass, PP-distributor and steam inlet tube. During this procedure the level inside the steam generator will decrease. This is recognized by the level sensor and the pump H₂O for the filling of the steam generator will be switched on. If there is no sample tube present or if the tap for cooling water is not open, a distillation is not possible.

Remark:

Especially if the water for the steam generator is not very clean or if there any kind of dirt within the reservoir, the following problem may occur:

- After some distillations the instrument shows the error message „E3“, no water for steam generator and the program stops.
- After pressing „RUN“ the display shows „H“, wait for steam.

Explanation:

If the steam generator is contaminated with dirt, the boiling and bubbling water will build up foam above the water level. The level sensor detects the foam as water and prevents the pump from running even though the water level in the steam generator is not sufficient. After some time the liquid level or the foam will have diminished to such an extent that no more liquid is detected, and the system switches on the pump. Within 15 s a sufficient water level should now be detected. As this is not possible in such a short time the error „E3“ will appear on the display.

If the „RUN“ key is now pressed, the system will get into the filling mode and the steam generator will be filled to the height stipulated. However, at the same time, due to the cold water, the steam pressure collapses, and the unit heats up again until stand-by is reached. Only now further distillations can be run. So please note that a reaction as described is not a malfunction, but a sign of unwanted foam in the steam generator. If this happens, clean the steam generator and the reservoir.

8.2 Safety devices for steam generation

- 8.2.1 Level sensor
- 8.2.2 Excess-temperature device
- 8.2.3 Pressure sensor
- 8.2.4 Excess-pressure valve
- 8.2.5 Micro switch for sample tube

8.2.1 Level sensor

The level sensor constantly controls and regulates the level of water inside the steam generator. The sensor itself is constantly checked by the electronics; in case of a malfunction, the instrument will give an error message. If the level detection system fails totally, the tubular heating element will be switched off in case of a level decreasing under the allowed minimum range.

The level sensor can only compare between insufficient or sufficient water inside the steam generator. This is done by changing the frequency it sends to the Control-PCB.

8.2.2 Excess-temperature device

In case that due to a total failure of the level sensor and the control electronics lack of water in the steam generator cannot be detected, the tubular heating element must be protected against overheating. In such a case the excess-temperature device will switch off the heating circuit at about 150°C. After trouble shooting and cooling off of the steam generator the pin of the excess-temperature device has to be pressed back into position. Now the next distillation can be started.

8.2.3 Pressure sensor

The pressure sensor is placed directly on the Control PCB and continuously checks the pressure inside the steam generator. If this sensor detects a higher pressure than 0,45 bar, the tubular heating element is switched off, and the instrument gives an error message.

8.2.4 Excess-pressure valve

In case of a total failure of pressure sensor and control electronics, the instrument must be protected against an increasing pressure. At about 0,5 bar the excess-pressure valve will open mechanically so that any damage of the instrument can definitely be avoided. If this happens, the instrument has to be switched off immediately.

8.2.5 Micro switch for sample tube

This switch ensures that a distillation is not run without a sample tube. In case you try to start the system without a sample tube, the start is prevented by the switch. Thus there is no danger of scalding.

8.3 Testing the safety devices for steam generation

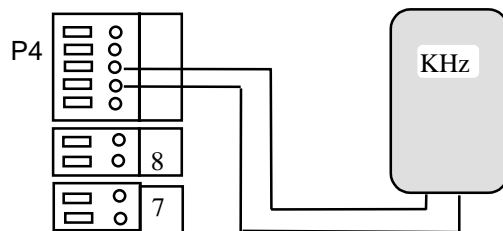
- 8.3.1 Level sensor
- 8.3.2 Excess-temperature device
- 8.3.3 Pressure sensor
- 8.2.4 Excess-pressure valve
- 8.2.5 Micro switch for sample tube

8.3.1 Level sensor

With a filled steam generator a frequency < 20 KHz should be measured.
With an empty steam generator a frequency >130 KHz should be measured.

Measurement of the frequencies VAP 20/30:

To measure the frequency the gauge has to be connected to collection plug P4 at pins 2 + 3. P4 is to be found on the Power PCB, above those orange coloured plugs. The occupation of P4 is to be found in the circuit diagram (see 4.2).



Measurement of frequency VAP 40:

At instruments of the type Vapodest 40 the frequency can be checked with the inbuilt test-program without opening the rear wall. To enter the test-program the keys „ “ and „ 9 “ have to be pressed at the same time. The instrument shows the menu display for the I/O Test and the frequency can be read:

filled steam generator	H(igh) about 5 KHz
empty steam generator	L(ow) about 90 KHz

To quit the test-program the keys „ “ and „ Reset “ have to be pressed at the same time. It is also possible to measure the frequency as in the description for VAP 20/30. The same values are valid.

8.3.2 Excess-temperature device

The adjustment of the excess-temperature device should not be changed. It has been adjusted here at C. Gerhardt so that an excess-temperature of about 150° C will open the heating circuit. This device is directly switched into the the 230 V circuit. A damaged excess-temperature device should not be bridged but replaced immediately.

8.3.3 Pressure sensor

The pressure sensor is maintenance-free. In case of problems with pressure measuring or in case of a broken pressure sensor, the complete Control - PCB has to be changed (see 10.).

The way to measure the pressure inside the steam generator is as follows:

VAP 20/30

When the Vapodest is still cold, a gauge for pressure measurement 0 - 1 bar has to be connected into the line from steam generator to pressure sensor as the schematics shows. If available, connect an instrument to measure the current the instrument draws into the mains circuit.

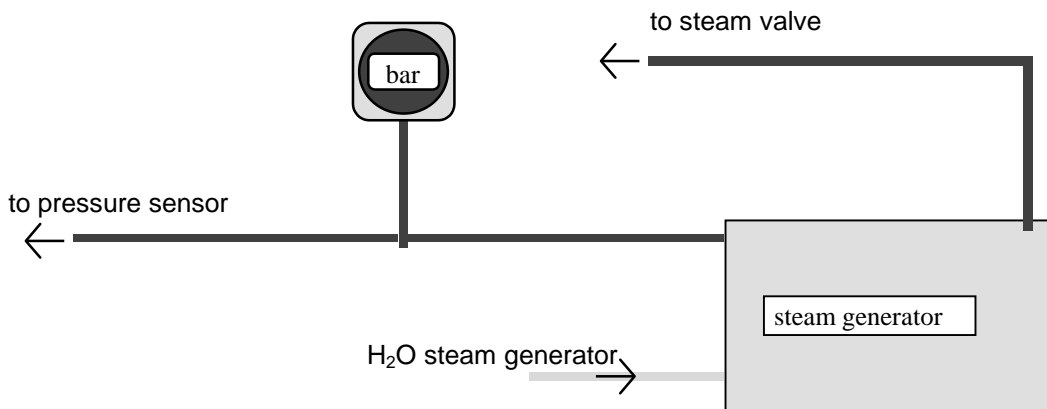
Switch on the Vapodest. The electronics will measure the level of water inside the steam generator and, if necessary, the pump for H₂O will run. Then the heating element is switched on.

When the pressure inside the steam generator begins to increase, the ventilation valve will close, and the pressure of about 0.2 bar will build up. The instruments switches into stand-by and indicates that it is ready for distillation.

If the instrument goes into stand-by well below or well above than 0.2 bar, the Control-PCB has to be replaced (see 10.).

When measuring the pressure it is important to make sure that all tubing connections are fixed properly. The connections should only be loosened when the instrument has cooled down:

Risk of scalding because of hot steam of more than 100°C!



At instruments of the type Vapodest 40 the pressure can be checked with the inbuilt test-program without opening the rear wall. To enter the test-program the keys „ ` “ and „ 9 “ have to be pressed at the same time. The instrument shows the menu display for the I/O test. The pressure as measured by the pressure sensor can now be read.

To quit the test-program the keys „ ` “ and „ Reset “ have to be pressed at the same time.

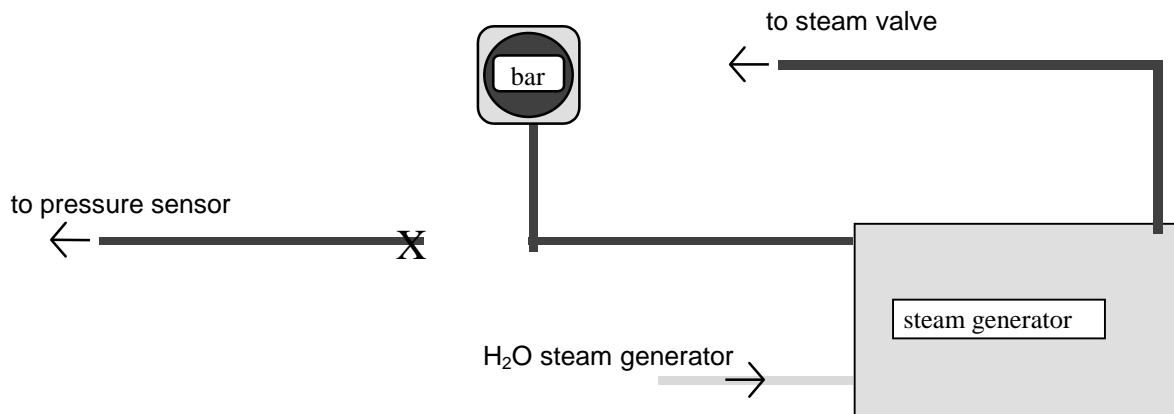
8.3.4 Excess-pressure valve

The adjustment of the excess pressure valve should not be changed. It has been adjusted here at C. Gerhardt so that an excess-pressure of about 0.5 bar will activate the valve.

The following instructions will help to adjust the excess-pressure valve if it becomes necessary nevertheless.

When the Vapodest is still cold, a gauge for pressure measurement 0 - 1 bar has to be connected to the steam generator as the schematics show. The tubing to the pressure sensor is left without any connection to prevent the switching off of the heating when reaching a pressure of 0.2 bar.

If available connect an instrument to measure the current the instrument draws into the mains circuit.



Switch on the Vapodest. The electronics measures the level of water inside the steam generator and, if necessary, the pump for H₂O will run. When a sufficient water level is reached the heating element is switched on.

When the pressure inside the steam generator begins to increase the ventilation valve will close, and the pressure is able to increase more and more because of the disconnected pressure sensor. Observe carefully the increasing pressure, and make a note at which pressure the excess-pressure valve opens. In case that the valve does not open at a pressure of about 0.5 bar, immediately switch off the instrument!

Excess-pressure valve has to open earlier (lower pressure):

Remove the brass cap and slightly loosen the big nut. Turn the adjusting screw slightly anti-clockwise, and tighten the nut very well. Take care that the adjusting screw stays in the adjusted position. When the adjustment is done, repeat the above described procedure to test the excess-pressure valve.

Excess-pressure valve has to open later (higher pressure):

Remove the brass cap and slightly loosen the big nut. Turn the adjusting screw slightly clockwise, and lock the nut very well. Take care that the adjusting screw stays in the adjusted position. When the adjustment is done, repeat the above described procedure to test the excess-pressure valve.

When measuring the pressure it is important to make sure that all tubing connections are fixed properly. Carefully observe the increasing pressure and make sure you do not touch the hot excess-pressure valve. The connections should only be opened when the instrument has cooled down:

Risk of scalding because of hot steam of more than 100°C!

8.3.5 Micro switch for sample tube

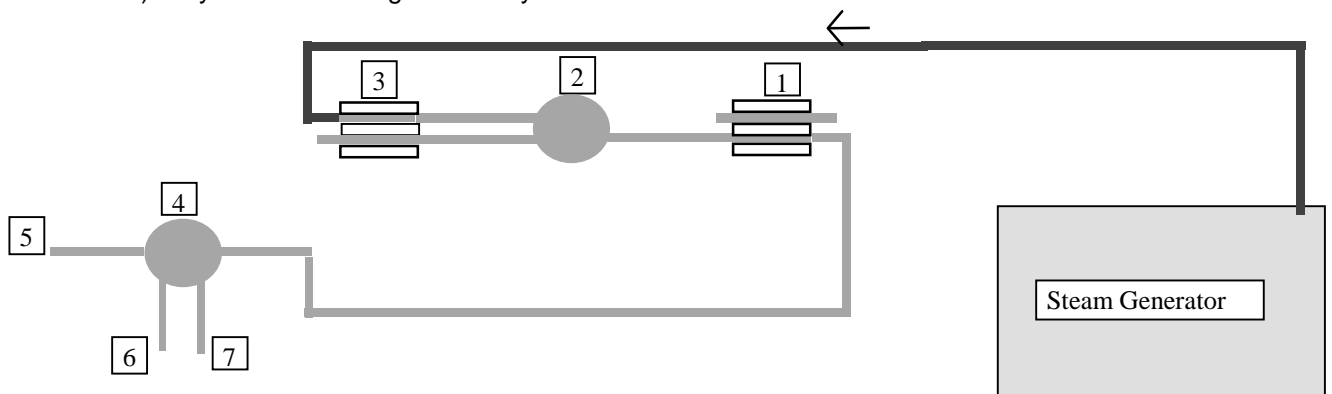
This switch prevents the start of a distillation without any sample tube. Without a tube the switch is activated, which means that the circuit is open. With a sample tube the switch is not activated, and the circuit is closed. The switch is located inside the instrument directly fixed on the clamping device for the sample tube.

8.4 General description of steam inlet / sample suction

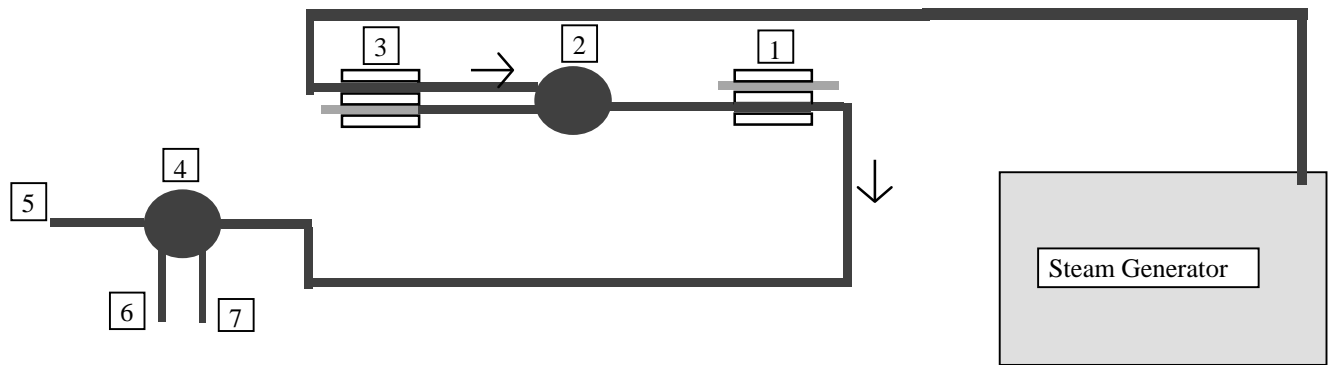
Steam inlet:

During stand-by steam of about 0.2 bar only reach the steam valve. During stand-by both valves, steam valve and shut-off valve are dead. After starting a distillation, the steam valve gets alive which means it will open. The ventilation valve however, still stays dead, so that it is open for steam. The steam now can pass through the steam valve, ventilation glass, shut-off valve, PP-distributor and steam inlet tubing into the sample tube. From there the distillate will pass through the distribution head and the condenser into the receiver. The ventilation valve of the condenser must be closed. The steam can also pass through the PP-distributor until it reaches the pump for sample suction. Steam will also pass through the tubing for the dilution of the sample until it reaches the non-return valve of the pump for H₂O sample.

a) Way of steam during stand - by



b) Way of steam during distillation



1 = Shut-off valve
2 = Ventilation glass
3 = Steam valve

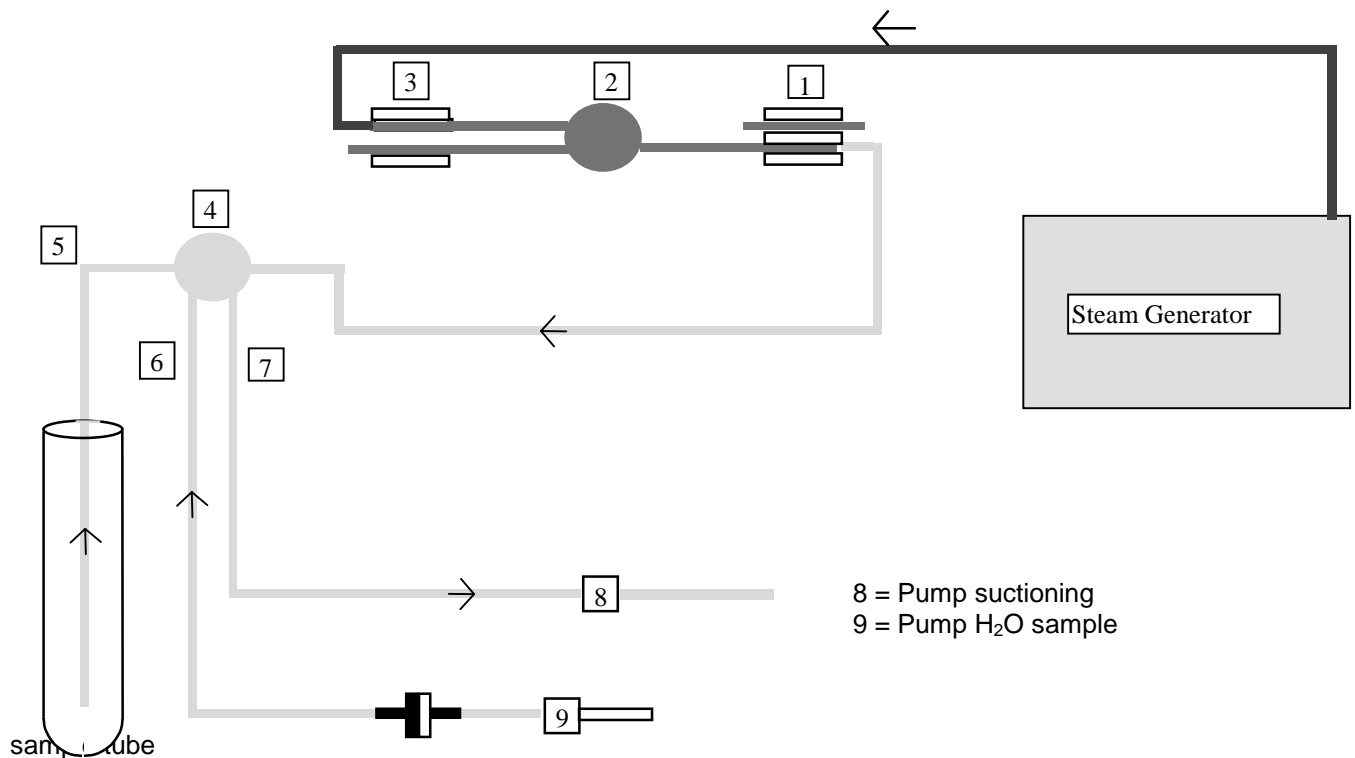
4 = PP - connector
5 = Inlet tube steam
6 = Tubing H₂O sample

7 = Tubing suctioning

Sample suction:

After the distillation the steam valve will not draw current any longer, and it closes the path to the ventilation glass. For suctioning now the shut-off valve will get alive and it closes the tubing. too. Consequently the pump for sample suctioning is able to empty the sample tube. In this case the ventilation valve of the condenser must open. If not, the pump will also empty the receiver.

The pump for sample suction also draws against the pump for sample dilution.



8 = Pump suctioning
9 = Pump H₂O sample

9.1 Diaphragm pump

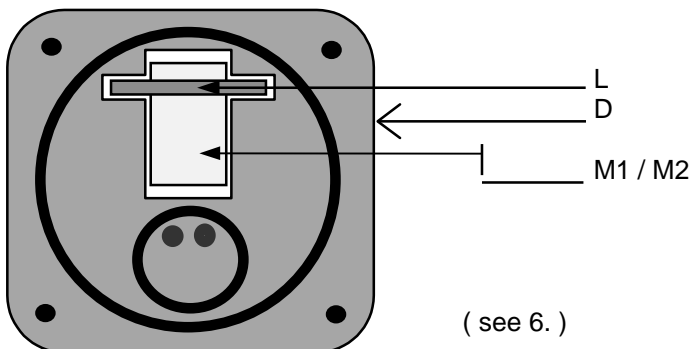
The diaphragm pumps used in VAPODEST instruments are almost maintenance-free. Depending on the kind of liquid the volume the pumps deliver is about 100ml / 10 s. Make sure that the tanks are not placed in a higher position than the instrument itself.

It may occur that the volume becomes less than the normal range because of dirt deposit inside the pump housing. In this case the pump and the valves inside the pump housing should be cleaned.

Cleaning the valves:

To clean the pump it is necessary to disconnect all the tubes and to remove the rear wall. Loosen the 4 screws from the badly working pump, and take away the cover of the pump head. Also take away the connection-piece for angle connections and the diaphragm.

Carefully loosen the clamp for the valve plates and the valve plates themselves. Clean all the parts and re-assemble the pump ensuring that all parts are put back into the right position. Close the rear wall, and do not forget the ground connection! Install again all the tubings and let the instrument run to see if everything works well.



L	= Clamp for valve tiles
D	= Connection piece for square connections
M1 / M2	= valve plates

9.2 Peristaltic pump

Also the peristaltic pumps are maintenance-free. At least once a year the neoprene tubing should be replaced:

- Remove inlet and outlet tube
- Twist s-shaped bar on the left hand side of the pump
- Take out the plastic housing containing the tubing
- When fitting the new tubing ensure that the u-shaped lugs locate in their recesses to fix the tube into the plastic housing
- The complete plastic housing is now inserted into the guides of the pump body before locking in position with the S-bar



S-shaped bar



plastic housing

Description	Part-No.
Plastic housing for tubing	10327
Spare tubing Neoprene	10370
Guides for the pump body.	10371
S-shaped locking bar	10373

Replacement of the Control PCB

With the new Vapodest 20/30 it is possible to exchange the Control PCB from a Vap 20 to a VAP 30.

In case of a service it will now be easier to have the right PCB on stock because now it does not matter any longer if the PCB is for a VAP 20 or for a VAP 30. The software will check which keyboard is present, and then the processor will adapt the PCB.

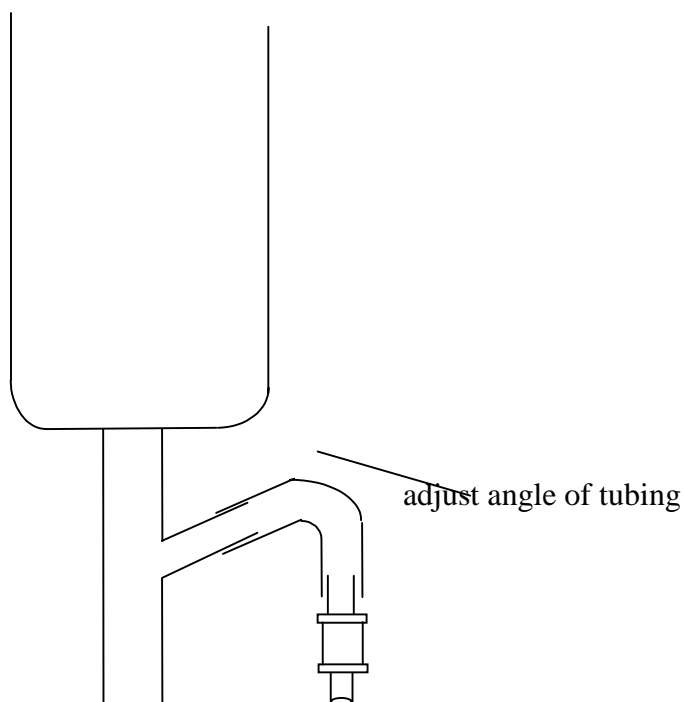
In order to ensure that the software will work after the replacement of the Control PCB it is necessary to press „PROG“ and „RESET“ at the same time and to switch on the instrument while still pressing the keys.

Modification 16.03.1995

Draw.-No. 1120

Part.-No. 20903

The tubing with part-no.: 20903 is shortened to a length of 150 mm. When installing the shortened tubing the angle has to be adjusted to the angle of the condenser outlet.



Modification beginning with series numbers:

VAP 20 from VAP 000233

VAP 30 from VAP 000182



Modification 1 from 30.03.1995

Draw.-No.: 1150

Part-No.: 20920 only VAP 30/40

The silicone-tubing part-no. 20914 from pump H₂O to PP-distributor is replaced against Verprene-tubing Part-No. 20920.

Additionally there is clamp Part-No. 17907 used. It fixes the new tubing to the PP-distributor.

Modification beginning with series numbers:

VAP 20 from VAP 000242

VAP 30 from VAP 000183



Modification 2 from 30.03.1995

Only diaphragm pump **NaOH**, Part-No. 10310!

The PVC-tubing between PP-angle connection (10317) and the PVC non-return valve (10329) is replaced against Isoversinic-tubing part-no. 20918.

The other diaphragm pumps are not modified.

Additionally there are 2 clamps Part-No. 27101 used to fix the new tubing on both ends.

Modification beginning with series numbers:

VAP 20 from VAP 000242

VAP 30 from VAP 000183



Modification 20.06.1995

Draw.-No.: 160, 163
Part-No.: 10385, 40269

Due to modifications of the solenoid pinch valves the following kit is to be used for replacement:

Modification-kit part.-no.: **2/760050**

2. After modification ventilation glass part-no. 40269 is replaced by ventilation glass part-no 40272.(Part of modification kit)

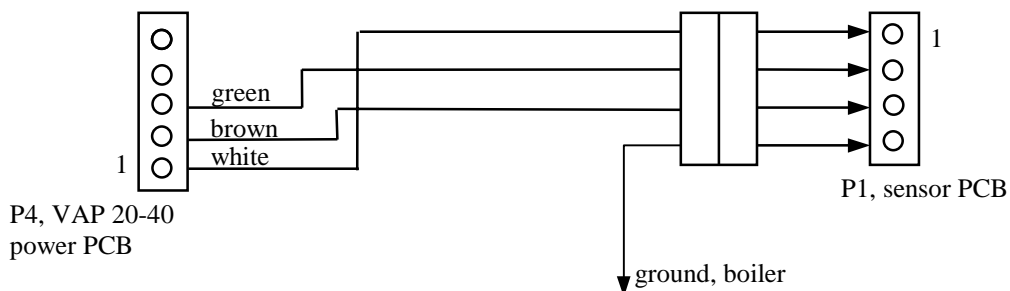
Modification beginning with series numbers:

VAP 20	230 V	VAP 000294
	240 V	VAP 000180
VAP 30	230 V	VAP 000379
	240 V	VAP 000173
VAP 40	230 V	VAP 000349

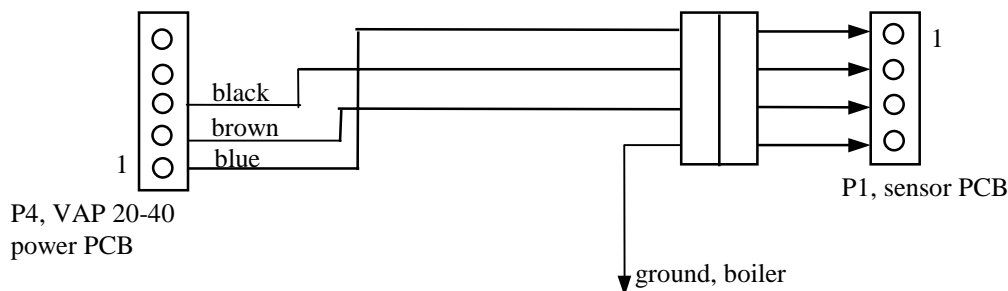
Modification 11.08.1995

As the technology of the new level-sensors has changed, they now have 4 contacts instead of 3. If you have to install one of the new sensors/boilers into older instruments, you will have problems with the connections at VAP 20/30. In order to do so you have to modify the cabling between the power PCB and sensor plug. Depending on the cabling of the sensor there are two possible ways of modification:

Older version: cabling white, brown, green



Newer version: cabling blue, brown, black



Modification beginning with series numbers:

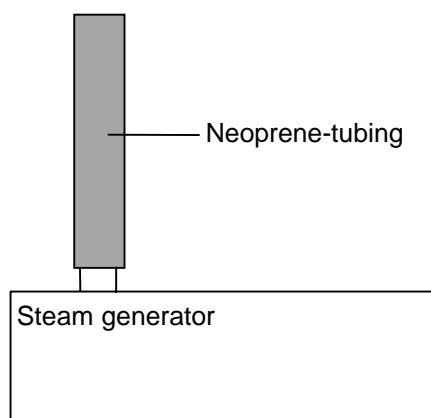
VAP 20	230 V	VAP 000279
	240 V	VAP 000180
VAP 30	230 V	VAP 000361
	240 V	VAP 000173
VAP 40	230 V	VAP 000346

Modification 27.09.1995

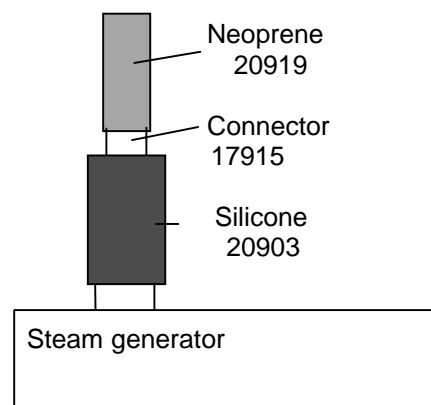
As adaptor for the outlet of the steam generator a connection piece part-no. 17915 and a silicone-tubing(6x10 mm, lenght 45 mm) part-no. 20903 are used to connect the Neoprene-tubing 20919.

Of the original Neoprene-tubing you have to cut off 45 mm.

Old version



New version



Modification beginning with series numbers:

VAP 20	230 V	VAP 000294
	240 V	VAP 000180
VAP 30	230 V	VAP 000379
	240 V	VAP 000173
VAP 40	230 V	VAP 000349



Modification 15.12.1995

Diaphragm pump 10310 NaOH

Only acid-resistant version !

The valve plates made of stainless steel (10328) are replaced by valve plates made of PTFE No. 10327.(see 6.)

Already modified pumps get the part-no. 10311